REVIEW OF THE INTERAGENCY

OIL POLLUTION RESEARCH AND TECHNOLOGY PLAN

Final Report of the

Committee on Oil Spill Research and Development

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Marine Board
Commission on Engineering and Technical Systems
National Research Council

FINAL REPORT OF THE COMMITTEE ON OIL SPILL RESEARCH AND DEVELOPMENT[1]

Abstract

The National Research Council's Committee on Oil Spill Research and Development (NRC Committee) was appointed, in response to the congressional mandate expressed in the Oil Pollution Act of 1990 (OPA-90), to review and assess the federal oil pollution research and development (R&D) plan and to provide recommendations regarding the federal program and direction. The NRC Committee issued its first report in April 1993. This final report notes that, although Congress has not appropriated funds to support research in areas called out in OPA-90, some research is underway supported by other funding and that the original federal plan is obsolete. The federal agencies comprising the Interagency Coordinating Committee on Oil Pollution Research, in 1994, have taken action to articulate research objectives, establish a framework and strategy central to a dynamic planning process, and update their research program in concert with actual and anticipated funding. Since this process and plan revision is not complete and a currently valid research plan has not been available, the NRC Committee could not carry out the review called for in OPA-90. However, specific actions are recommended for the Interagency Committee in its development of its research plan: give recognition in planning to research and technical projects that impact spill prevention even if these activities are not supported by OPA-90 funds; give particular attention to research involving means to reduce human error as the major cause of accidents involving oil spills; solicit public input in the R&D planning process, possibly using Area Committees established under OPA-90; and establish a system of dialogue, consultation, and guidelines--involving the Environmental Protection Agency--to allow legitimate applicants to conduct necessary field testing of oil spill response measures such as burning, use of chemical dispersants, and bioremediation techniques.

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[illegible] Representatives are: Joseph Angelo, U.S. Coast Guard Headquarters; CDR Lee Ellwein, U.S. Coast Guard Headquarters.

The National Research Council's Committee on Oil Spill Research and Development was established in 1992 in response to the mandate of Congress, as expressed in the Oil Pollution Act of 1990, and a request by the U.S. Coast Guard on behalf of the Interagency Coordinating Committee on Oil Pollution Research (hereafter the "Interagency Committee"). The Committee on Oil Spill Research and Development (hereafter the NRC Committee) was charged to review and assess the interagency research and development plan and (henceforth referred to as the R&D plan) to provide conclusions regarding the program and its direction as described in the plan. In addition, the NRC Committee was asked to provide recommendations regarding priorities and areas of needed research, development, and demonstration of technologies, as well as evaluation and testing. The NRC Committee produced its first report in the spring of 1993 (NRC, 1993); this letter is intended to serve as the final report of the NRC Committee. This letter raises a number of important points with regard to its charge and provides advice that may be useful in the revision of the Interagency Committee's R&D plan.

Present Status of R&D Planning/Implications for the Committee on Oil Spill R&D

In the year since the publication of the first report by the Committee on Oil Spill R&D, the NRC Committee has observed that, while Congress authorized an interagency oil pollution R&D program in the Oil Pollution Act of 1990 (P.L. 101-380), it has not appropriated funds specifically for that purpose. Nevertheless, agencies are pursuing some research on the subject in areas where such research is consistent with agency missions and funded programs, but the funding of these projects is based on appropriations not associated with the R&D authorizations of the Oil Pollution Act of 1990. In brief, there has been no net addition to the funding base for oil spill research. This outcome is not surprising, given current interest within the Congress and the executive branch in reducing the federal deficit, but it does little to advance the R&D program mandated under the Oil Pollution Act of 1990. The NRC Committee finds it difficult to avoid the conclusion that, as time has passed, most agencies involved in planning, programming, and funding oil spill research have assigned low priority to these activities.

Therefore, the original federal R&D plan[2] examined in the NRC committee's first report, *Review of the Interagency Oil Pollution Research and Technology Plan* (NRC, 1993), has not been carried out. Furthermore, the NRC Committee deems the plan now to be obsolete. The NRC Committee had anticipated that the plan would be dynamic and that the planning process would go on to articulate an overall R&D strategy (including goals and objectives), as well as alternatives available to agencies for various contingencies; this anticipation has been overtaken by events. Although federal support of oil spill R&D continues, it does so at a significantly reduced level from that anticipated several years ago. Despite this reduction, the plan has not been revised to accommodate the reduced funding level. It is pointless for the NRC Committee to comment further on the original plan, as it bears no resemblance to actual R&D efforts and prospects. Nor is it based upon any well-articulated and analyzed R&D strategy or philosophy.

The NRC Committee believes there is little more it can do at present, given the limited scope of reported oil spill R&D activities now conducted by federal agencies and the inadequacy, in the committee's judgment, of the planning for those efforts. Although the Interagency Coordinating Committee on Oil Pollution Research has met regularly to coordinate the program, it has been making bricks without straw, because Congress did not appropriate any new funds and whatever funds have been available have not been used in accordance with any coherent strategic plan.

Before there can be any meaningful additional NRC review, the Interagency Committee should prepare a revised plan that is consistent with current and expected funding for oil spill R&D and that is based upon a strategic analysis of the oil spill problem. (Such revision also is needed as a basis for the mandated biennial interagency report to Congress, which should reflect 1994 activity and plans.) Based on presentations made to the NRC

[2] The original plan was dated April 24, 1992.

Committee on February 10, 1994, much of the information needed to update the plans of the agencies appears to be available. As noted above, some research is being carried out by at least four federal agencies. The project descriptions and funding data still need to be integrated across agencies and extended through at least fiscal year 1996. In addition, each agency represented on the Interagency Committee needs to describe the range of research activity and projects that the agency would pursue, depending on the funding available.

In addition to updating the plan, the Interagency Committee needs to develop a rational framework for comprehensive R&D planning. In its first report, the NRC Committee recommended that, to supply such a framework, an analysis be conducted of the oil spill system, including all aspects of the oil handling and transport process, spill evolution, and intervention techniques for preventing or minimizing environmental damage. Due to lack of funds, this analysis has not been undertaken. Moreover, the alternative approach of establishing R&D priorities based on oil spill accident statistics and causal information cannot be pursued either, due to the paucity of such data. The NRC Committee learned during its February 10, 1994, meeting that the Coast Guard is exploring ways to undertake an analysis of the oil spill system through its grant authority under the Oil Pollution Act of 1990;[3] the committee strongly supports this endeavor.

Specific Actions Recommended

In addition to calling attention to the absence of an updated plan and a rational framework for a coherent plan, the NRC Committee feels compelled to comment on a number of individual aspects of the current R&D program, which include (1) accident and spill prevention, (2) human factors, (3) public participation in research planning, and (3) field experiments with response technologies.

Spill Prevention Research

Although the interagency plan mentions little R&D related to accident and spill prevention, the NRC Committee has learned that agencies are conducting several research activities in these areas. These activities—such as research on the behavior of tanker structures during groundings, assessments of tanker navigation safety standards, and studies to determine standards for vessel plating thickness standards—should lead to design and regulatory measures that will prevent spills or reduce the volume spilled in the event of an accident. This prevention-related R&D and assessment should be reported as part of the interagency plan (perhaps identified explicitly as not undertaken for the purposes of the Oil Pollution Act of 1990), in order to make evident the totality of activities that might help prevent or mitigate the damage caused by oil spills. The scope of relevant R&D becomes broader when one considers that some oil spill events arise from causes specific to the maritime environment (e.g., navigation failures, ship collisions), while others stem from what might be described as industrial accidents occurring on ships (e.g., wrong valve opened, valve left open too long).

Human Factors in Spill Prevention

In keeping with its broad planning perspective, the NRC Committee considers human factors research related to spill prevention to be a high priority and urges the Interagency Committee to devote particular attention to projects in this area. Human error appears to be an important cause of many, if not most, spill-related events. A National Transportation Safety Board study found human error to be the primary cause of 66 percent of the collision accidents investigated (NTSB, 1981). Other studies have found that problems in vessel and bridge design, task specification, manning, procedures, and training, as well as other human factor concerns, are the

[3] The delay of funding for this analysis has been attributed, in part, to the General Accounting Office report that questions the use of research, development, testing, and evaluation funds for strategic analyses that would lead to establishing priorities for research (GAO, 1993). The NRC Committee, whose members have a great deal of experience in R&D, is baffled by any such opinion.

key elements driving human error in the marine environment (Moore et al., 1993; NRC, 1976, 1981). In offshore oil and gas operations, human error has also been a major cause of injuries, deaths, and spills (Bea and Moore, 1992). Although the magnitude of the problem has been recognized for decades, the NRC Committee was concerned about the fact that little progress has been made in achieving the research agenda necessary to address the problem.

Most of the research needs that have been identified (see for example Sanquist et al., 1993) are directed generally to improving maritime safety, and not specifically to preventing oil spills. Nevertheless, the committee believes that the scope and magnitude of human factors concerns addressed (by Sanquist and others) would also be applicable to preventing oil spills. This reasoning is partially supported by analysis of the *Exxon Valdez* accident (Moore, 1994) and the Piper Alpha platform disaster in the North Sea (Paté-Cornell, 1993 a,b).

The initial interagency R&D plan gave recognition to the importance of human factors in vessel operations, but the NRC Committee encourages the Interagency Committee to consider human factors in facility operations as well as in vessel applications. Due to the potential significance of human factors as causes of spills that are associated with facilities and vessel loading and unloading, the committee feels that it is appropriate to support human factors research in these areas as well as in vessel operations underway.

An important adjunct to research on human factors in vessel and loading operation is the development and implementation of accident investigation techniques that will elicit reliable and valid human factors information. Data collection and analysis guided by a model of accident causation will greatly enhance understanding of the nature of accidents and incidents, how the actions of the people immediately involved are linked to other factors, and how similar occurrences can be prevented.

Public Participation in Research Planning

Preventing oil spills, responding to those that do occur, and dealing with the pollution from them have been political issues and concerns in recent years, particularly in certain geographic areas. The political nature of the issue reflects the many organized interests that justifiably have concerns about the steps taken to limit the environmental damage from oil spills. Among the steps government can take is to build better technical bases for public policy through appropriate R&D. Thus, the establishment of a revised R&D plan for oil spill prevention, response, and mitigation can be expected to be of great interest to the potentially affected parties.

Particularly in the context of insufficient funds to explore all of the recommended research areas, the NRC Committee recommends that the Interagency Committee solicit public input on the R&D plan, especially with regard to funding priorities. An efficient way to receive such input may be through the involvement of the Area Committees that were established as part of the Oil Pollution Act of 1990.

Many of these Area Committees are likely to involve a good cross-section of the interests and perspectives in a given area, including relevant federal, state, and local agencies and environmental and business groups. The Area Committees can be important sources of support and legitimacy for the use of particular spill contingency response measures by the Regional Response Teams.[4] The committees thus should be vitally concerned with the research agenda on the relative and absolute effectiveness of the various countermeasures in

[4]Regional Response Teams (RRTs) were established by the Coast Guard to respond to marine spills and to implement the National Contingency Plan requirements called out by the Federal Water Pollution Control Act (October 18, 1972) and subsequent amendments. The Oil Pollution Act of 1990 further amended this requirement with the establishment of a National Response Unit (now deemed the National Response Team), which is the parent unit for RRTs. Area Committees, authorized by the Oil Pollution Control Act of 1990, are subject to the Area Contingency Plan operating under the National Response Unit.

use or under development. At the same time, it can be expected that many of the agencies represented on the Area Committees will also have considerable stake in preventing oil pollution in the region and therefore will be interested in ways to prevent oil spills. This was evidenced, at least in the state of Washington, by agency representatives from organizations concerned with the marine safety and environmental protection for Puget Sound who stated to the NRC Committee that prevention was their foremost interest. They also noted that, in the course of trying to make policy decisions about shipping safety and environmental pollution, they were able to identify various kinds of research needs.

Area Committees could be encouraged to establish a subcommittee to consider research needs in both prevention and response. Representatives of the subcommittees then could be included in a participatory process for the revision of the Interagency Oil Pollution Research and Technology Plan. Specialists in involving the public in institutional decision making have found that soliciting such input as part of the design of the plan is likely to be more productive than involving the public only in review of the final plan. The sense of involvement in the R&D plan can develop an important constituency for promoting its implementation.

Field Experiments with Spill Response Technologies and the Need for a Better Definition of the Permitting Process.

At-sea and shoreline testing of spill response technologies is important as well. In presentations to the NRC Committee, various agencies stressed the need for field tests involving controlled spills to complete research now underway. The Environmental Protection Agency (EPA) made this point with regard to research on dispersants and bioremediation. The Coast Guard places primary importance on further test burns at sea, in order to support planning for the Regional Response Teams. The NRC Committee believes that more at-sea field experiments on burning will be required before the circumstances under which burning is a useful option are understood well enough that burning can become a useful response technique. Field experiments and demonstrations are also essential to the acceptance of chemical dispersants and the use of bioremediation techniques. In its first report, the NRC Committee recommended that a program of field testing be incorporated into the federal R&D program and concluded that experimentation has been hindered by the lack of a well-defined permitting process for such tests. The present EPA guidelines relate only to the requirement for obtaining a permit and list the topics that must be considered in a permit application, but no criteria have been established that must be met to obtain a permit for conducting a controlled spill test or research at sea.

There is no point in undertaking R&D unless the process for converting the results to useful technology, i.e., testing demonstration, and dissemination of results, can be carried out. Many promising techniques may never be understood and demonstrated sufficiently to be of real use in spill events unless the permitting process is improved, EPA regulatory authorities take an active role to assure that the best possible tools can be made available for spill responses, and information is accumulated about the field performance of these tools. Therefore, the current barrier to establishing a test spill permitting process undermines the justification for undertaking much of the research required to understand the use of burning, dispersants, and bioremediation.

Virtually all research groups involved in R&D agree about the necessity for field tests. Recent experience has created a situation in which these groups no longer consider making applications for a permit, because they believe that the applications will not be successful. Although the permitting process has yet to be clarified, based on testimony to the committee, the EPA appears to be making progress in developing permit criteria and guidelines. In order to continue progress, a system of dialogue and consultation that involves the EPA and legitimate test applicants should now be established. It should lead to the necessary field tests and the development of a database to support response strategies that can be implemented rapidly.

Future Action

While a systems analysis, a coherent strategy, and data and information concerning present and planned oil spill research are all lacking, as noted above, the NRC Committee is aware of efforts by the Interagency Committee

to produce these data and the elements of an updated research plan and strategy. Doing this work will require considerable time. Should data and documentation become available before the end of 1994, and should the Coast Guard wish to obtain further advice related to these new data and information, the NRC Committee remains available as appropriate. In the absence of such progress, the NRC Committee sees no purpose for its continued existence beyond its contracted end time of December 31, 1994. When the systems analysis has been completed, a draft strategic plan established, and a new program and budget plan established by the Interagency Committee, the Coast Guard may wish to ask the Marine Board for further advice.

The Committee on Oil Spill Research and Development hopes the comments in this report will be helpful and appreciates having the opportunity to be of service to the Coast Guard and the Interagency Coordinating Committee on Oil Spill Research.

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